

Appl. No. 10/760,139

Amendments to the Drawings:

Attached is one annotated drawing sheet showing changes to Fig. 3. Also enclosed are 4 replacement drawing sheets for Figs. 1-4.

Attachments: 4 Replacement Sheets
1 Annotated Sheet Showing Changes

Appl. No. 10/760,139

REMARKS

Claims 12-22 are pending after entry of the present amendment. In the Office Action dated July 3, 2007, the Examiner took the following action: (1) objected to the drawings; (2) rejected claims 1-11 and 14-21 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; (3) rejected claims 1-6, 8-11 and 14-20 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,824,664 to Austin et al. ("Austin"); (4) rejected claims 7, 12, 13 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Austin in view of U.S. Patent No. 6,368,871 to Christel et al. ("Christel"); (5) rejected claims 1, 3, 5, 9 and 10 for obviousness-type double patenting as being unpatentable over claims 1, 3-7, 14, 16-17 and 19-22 of U.S. Patent No. 7,014,747 to Cummings et al. ("Cummings 747") in view of Austin; (6) rejected claims 1, 6 and 14 for obviousness-type double patenting as being unpatentable over claims 1, 4-5 and 8 of U.S. Patent No. 7,204,923 to Cummings ("Cummings 923") in view of Austin; (7) rejected claims 1-3, 6-11, 14, 16 and 19 for obviousness-type double patenting as being unpatentable over claims 1, 3-6, 8 and 17-21 of co-pending Application No. 10/678,603; and (8) rejected claims 1-3 and 14 for obviousness-type double patenting as being unpatentable over claims 1, 3-7, 46 and 47 of co-pending Application No. 10/969,137.

Interview Summary

Applicants appreciate the Examiner's time in conducting an interview on October 17, 2007 at 10am Pacific Time. The Examiner, the undersigned (Jennifer M. Lane), and inventor Eric Cummings participated in the interview. Applicants discussed their disclosed technology, the Austin reference and the Christel reference. The Examiner's attention is much appreciated.

Cancelled Claims

Without admitting the propriety of the rejection, and without prejudice for presenting the claims in this or a related application, to expedite allowance of remaining claims in the Application, Applicants have cancelled claims 1-11.

Appl. No. 10/760,139

35 U.S.C. § 103 – The combination of Austin and Christel fail to disclose “trapping particles in a ring around a center of the radial array” as required by Applicants' Claim 21.

Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Austin in view of Christel. Applicants respectfully submit that neither reference discloses “trapping particles in a ring around a center of the radial array” as required by claim 21. Reconsideration is requested.

Applicants have disclosed methods including trapping particles in a ring around a center of an array. See Figure 1 and ¶20. The radial geometry of the arrays disclosed by Applicants allow particles to be trapped at a common radius in a ring around a center of the array. Specifically, Applicants' arrays are constructed such that the competition between a mobilizing force moving the particles through the system and the dielectrophoresis force constraining particles, traps particles into a ring. See ¶20. Trapping particles in a ring is not disclosed by Austin, Christel, or the combination of references, nor would such a trapping be possible with the arrays disclosed by Austin or Christel.

Austin simply discloses linear arrangements of features to trap particles at a linear location within a device (see Figure 8). The devices of Austin are not capable of trapping particles in a ring.

Christel discloses arrangements of posts within a channel (see Christel, Figure 8). Christel does not disclose trapping particles in a ring around the center of any post arrangements. Instead, Christel discloses passing sample through the chamber, and allowing particles to collect on the posts they happen to pass by (see col. 10, lines 17-19). The Examiner suggests that Christel's disclosure would enable one skilled in the art to design Applicants' system because Christel discloses trapping particles by tuning an AC field. See Office Action, page 11. However, Christel's disclosure of tuning an AC field is directed to frequency tuning – the selection of an appropriate frequency to cause the DNA particles, and not other particles, passing by to stick to the posts. See Christel, col. 8, line 67 – col. 9, line 2. Christel does not disclose the design of an array or of an electric field to cause particles to be trapped in a ring.

Accordingly, Applicants submit that at least claim 21 is patentable over Austin in view of Christel, and the §103 rejection of claim 21 should be withdrawn. To facilitate the Examiner's consideration of this issue, Applicants have presented clean new independent

Appl. No. 10/760,139

claim 22, containing the “trapping particles in a ring around a center of the radial array” limitation.

35 U.S.C. § 103 – Christel fails to disclose a “radial array”

Claims 12, 13, and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Austin in view of Christel. Applicants respectfully submit that Christel fails to disclose a “radial array” within the plain meaning of the term. The Examiner has endeavored to give Applicants' claims their broadest interpretation, and has interpreted “radial array” as recited in Applicants' claims 12, 13 and 21 to encompass structures disclosed by Christel, such as the structure shown in Christel's Figure 8 which depicts a hexagonally-packed grid of posts. See Office Action, page 11.

Applicants agree that the Examiner should give claim terms their broadest reasonable interpretation. However, the words of the claim must be given their plain meaning – the meaning “that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips v. AWH Corp.* 415 F.3d 1303, 1313 (Fed. Cir. 2005). See also MPEP 2111.01. If dictionaries show more than one definition for the term, the intrinsic record (including the specification) must be consulted to “identify which of the different possible definitions is most consistent with Applicants' use of the terms.” *Brookhill-Wil 1*, 334 F.3d at 1300 (Fed. Cir. 2003). See MPEP 2111.01 III.

Applicants respectfully submit that Christel's structures are not “radial arrays”. Applicants have attached a Merriam-Webster Online Dictionary definition of the adjective ‘radial’ as Exhibit 1. There are four numbered definitions listed. To choose between dictionary definitions, the MPEP instructs the Examiner to choose the one most consistent with Applicants' use in the specification. See MPEP 2111.01 III. Applicants submit that definition 2b is most applicable to Applicants' disclosure – “characterized by divergence from a center”. And indeed, the choice of this definition is supported by the radial arrays Applicants have depicted in Figures 1 and 2, where the features are characterized by their placement from the center of the array. Even if the Examiner were to select Definition 1 – “arranged or having parts arranged like rays,” the definition of ‘ray’ should then be consulted, which applicants have attached as Exhibit 2. Applicants submit the applicable definition of ‘ray’ is definition 3a – “any of a group of lines

Appl. No. 10/760,139

diverging from a common center.” Accordingly, the definition of ‘ray’ itself includes a notion of a common center or source.

Christel does not disclose arranging features around a common center, or characterized by their relationship with a center. Christel simply discloses a regular grid of posts, which may be within a hexagonal area, as shown in Fig. 8. Christel does not disclose a radial array which would be an array with features “characterized by divergence from a center,” as dictated by the plain meaning of the term most consistent with Applicants' specification.

Accordingly, at least because Christel fails to disclose a “radial array,” Applicants submit that claims 12, 13 and 21 are patentable over Austin in view of Christel and reconsideration is respectfully requested.

35 USC § 112 – Applicants' specification contains adequate § 112 support for the use of electroosmotic flow or avoiding the suppression of electroosmotic flow.

The Examiner has rejected claims 14-21 under 35 U.S.C. § 112 as failing to comply with the written description requirement regarding the limitations “avoiding suppression of electroosmotic flow” and “employing electroosmotic flow.” Applicants respectfully submit the application contains adequate support for the claim terms. The objected to phrases simply make explicit that which was inherent in the original application's disclosure. See MPEP § 2163(I)(B). A person of ordinary skill in the art would understand that these claim limitations are necessarily present in Applicants' disclosure.

One of ordinary skill in the art would understand that electrokinetic transport, as disclosed by Applicants in the specification, includes the use of electrophoretic flow as well as electroosmotic flow. As evidence, Applicants have attached as Exhibit 3, a copy of J.I. Molho et al. “Fluid Transport Mechanisms in Microfluidic Devices,” Micro-Electro-Mechanical Systems (MEMS), 1998 ASME International Mechanical Engineering Congress and Exposition (DSC-Vol.66). On the second page, left column, the reference defines electrokinetic flow as “the combination of electroosmotic and electrophoretic transport.” This reference was brought to the Office's attention in the response to the preceding office action.

Exhibit 4 is a copy of Shaw, D.J., Introduction to Colloid and Surface Chemistry: Third Edition; Butterworths: Boston, MA, 1980, pp. 162-163. The excerpt indicates that electrophoresis and electroosmosis are components of electrokinetic flow.

Appl. No. 10/760,139

Exhibit 5 is a copy of Probst, R.F., *Physiochemical Hydrodynamics: An Introduction*; Second Edition; John Wiley & Sons, Inc.: New York, NY, 2005; p.195. This reference citing Shaw (Exhibit 4), confirms that electrophoresis and electroosmosis are both components of electrokinetic phenomena.

The above Exhibits confirm that electrokinetic transport, as disclosed by Applicants includes electrophoretic and electroosmotic flow. Applicants simply recite utilizing electrokinetic transport, and nowhere indicate that electroosmotic flow would be suppressed. Accordingly, the amendments do not add new matter. Reconsideration and withdrawal of the § 112, first paragraph, rejection of claims 1-11 and 14-21 is respectfully requested.

The above Exhibits were also brought to a different Examiner's attention in application USSN 09/886,165, issued as U.S. Patent Number 7,014,747. The present application is a continuation-in-part of, and incorporates by reference, the '165 application. Claim 1 of the '747 patent recites "wherein electroosmotic flow of a fluid in said fluid flow channel is not suppressed". Applicants have included as Exhibit 6 a response to Office Action dated September 15, 2005 from the '165 application demonstrating § 112 support for the claim language in that application. See pages 8-11. Applicants respectfully submit that the '165 application, incorporated by reference into the instant application therefore also supports the amended claim language herein and withdrawal of the § 112, first paragraph rejection of claims 1-11 and 14-21 is respectfully requested.

35 U.S.C. § 102 – Austin fails to disclose electrokinetic transport to move particles through a device.

Claim 19 was rejected under 35 U.S.C. § 102(e) as being anticipated by Austin et al. (U.S. 6,824,664). Applicants respectfully submit that the claim is patentable over Austin at least because Austin fails to disclose electrokinetic transport.

The Examiner suggests that Austin discloses electrokinetic transport at col. 10, lines 37-49 (see Office Action, page 7). However, the disclosure does not recite electrokinetic transport, and contains a detailed disclosure only of pressure-driven or syringe pump flow. Austin refers to electrophoretic flow, which, as described above, is only one component of electrokinetic transport. See Austin, col. 12, lines 27-30.

Appl. No. 10/760,139

For at least this reason, Applicants request reconsideration and allowance of Claim 19, containing the limitation "employing electrokinetic transport."

35 U.S.C. § 102 – Austin's systems suppress electroosmotic flow and do not contemplate employing electroosmotic flow to move fluid through the active area of the device.

Claims 14-20 were rejected under 35 U.S.C. § 102(e) as being anticipated by Austin et al. (U.S. 6,824,664). Applicants respectfully submit that the claims are patentable over Austin at least because Austin contemplates suppressing electroosmotic flow and does not disclose employing electroosmotic flow, or avoiding the suppression of electroosmotic flow.

Recall that electroosmosis and electrophoresis are two components of electrokinetic transport, see above and Exhibit 3. Electrophoretic transport refers to the movement of a charged surface. See Exhibit 3 at page 2, second column. Therefore, electrokinetic transport of *uncharged* polarizable particles requires the presence of the electroosmotic component of electrokinetic flow. Austin, however, does not disclose utilizing the electroosmotic component of electrokinetic flow. This is evidenced in Austin's disclosure by the provision of pressure-driven flow for uncharged particles. Specifically, Austin discloses moving sample into the device with electric fields only when the sample has a charge. See col. 14, lines 62-67. This demonstrates Austin contemplated utilizing only electrophoretic transport. When uncharged particles are used, Austin discloses that a pressure driven or syringe pump flow will be required, demonstrating that Austin did not contemplate the use of electroosmotic flow. See col. 15, lines 1-6.

Further, Austin explicitly recites suppressing electroosmotic flow. See col. 20, lines 31-32. The Examiner notes that this explicit recitation is present in only one Example, when three Examples are listed in the specification. See Office Action, page 4. However, Applicants submit that Example 1 at col. 20, lines 23-35 is the only one of the three examples containing any explanation of placing samples into the device and trapping the samples. The other examples (Example 2 and 3) are directed toward amplifying and sequencing trapped DNA particles, respectively, to perform PCR. See col. 20, lines 37-39 and col. 21, lines 31-33. There is no need to discuss the flow of sample through the device in these examples dealing only with the PCR reactions.

Appl. No. 10/760,139

The Examiner cites col. 12, lines 40-56 as Austin's disclosure of electroosmotic flow (see Office Action, page 7). However, Austin disclosed that electroosmosis is suppressed using POP-6, an electroosmosis suppressing agent. See col. 20, lines 31-32. During description of the use of the device to trap and concentrate a sample at col. 12, lines 40-56, Austin does not disclose electroosmotic flow but rather further discloses that POP-6 is employed during transport, therefore suppressing electroosmotic flow. See col. 12, line 48. Accordingly, Austin discloses suppressing electroosmotic flow during use of the device and does not disclose the use of electroosmotic flow.

Austin never discloses the use of electrokinetic transport (including electroosmotic flow) or the use of electroosmotic flow to move particles through the device. Accordingly, Applicants respectfully request reconsideration of claims 14-20. Claim 14 recites "avoiding suppression of electroosmotic flow of the sample fluid," and claim 20 recites "employing electroosmotic flow." For at least these reasons, Applicants submit claims 14-20 are patentable over Austin, and reconsideration is requested.

Drawings

Applicants note the Examiner's objection to Figure 3 and has attached a new Figure 3 containing the inadvertently omitted reference numbers.

Double Patenting

Applicants note the Examiner's non-statutory double patenting rejections, and request that the rejections be held in abeyance until the identification of allowable subject matter.

Information Disclosure Statement


Applicants note that, to date, the Form PTO-1449 from the Supplemental Information Disclosure Statement filed June 29, 2007, has not been returned.

Appl. No. 10/760,139

All of the claims remaining in the application are now clearly allowable.
Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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Enclosures:

Postcard
Fee Transmittal Sheet (+ copy)
Exhibits 1-6
1 Sheet of Annotated Drawings (Figure 3)
4 Sheets of Replacement Drawings (Figures 1-4d)

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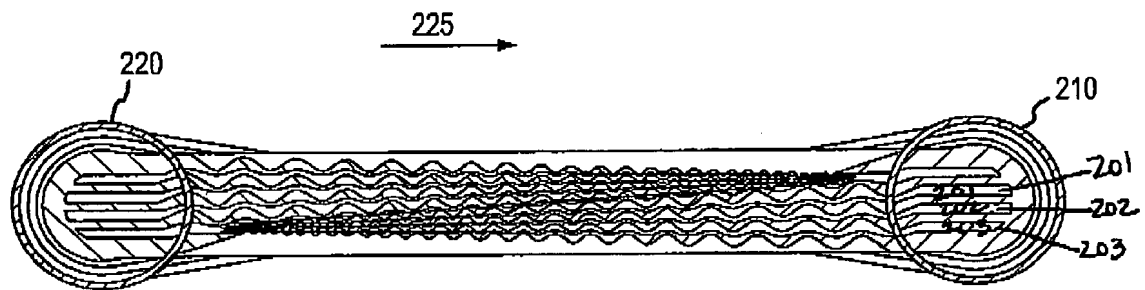


FIGURE 3